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Immediate installation of emergency lighting, in addition to that already provided, is recommended for three groups of existing schools--(1) air-conditioned schools and additions with compact plans having inside corridors and instructional areas artifically lighted, (2) senior high schools with adult education programs, and (3) community schools offering instructional programs to all age levels and using elementary, junior and senior high school plants. The need for additional provisions is based on the danger of panic in crowds when power fails due to causes outside of the building such as hurricanes, local storms, seasonal overloads, or national emergencies. Recommendations are given for providing emergency lighting systems independent of public utility service. (RH)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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SCHOOL CONSTRUCTION RESEARCH REPORT # 8
A STUDY OF EMERGENCY LIGHTING

FOR

THE DADE COUNTY BOARD OF PUBLIC INSTRUCTION

EF 003135

BY

PANCOAST, FERENDINO, GRAFTON & SKEELS

ARCHITECTS

PURPOSE: TO EXAMINE PRESENT SITUATION, NECESSITY FOR ADDITIONAL PROTECTION, AND RECOMMEND EQUIPMENT TO BE INSTALLED.

DATE: JULY 23, 1964

AIR CONDITIONED SCHOOLS:

THE INITIAL PROGRAM OF AIR CONDITIONED SCHOOLS, GLADES JUNIOR HIGH, WEST DUNBAR ELEMENTARY, MIAMI CAROL CITY HIGH AND MIAMI CORAL PARK HIGH, WERE BUILT AS FALL-OUT SHELTERS AND EQUIPPED WITH LP GAS BURNING MOTOR GENERATORS FOR EMERGENCY LIGHTING. MIAMI-DADE JUNIOR COLLEGE, BUILDING "A", IS EQUIPPED WITH A SIMILAR GENERATOR. MOST SUBSEQUENT SCHOOLS ARE WIRED FOR NIGHT LIGHTS AND EXIT SIGN LIGHTS ON SEPARATE CIRCUITS. THESE CIRCUITS WILL NOT BE AFFECTED BY FAILURE WITHIN THE BUILDING DUE TO OVERLOAD WHICH WOULD MELT FUSES OR THROW BREAKER OR BE TURNED OFF BY THROWING THE MAIN SWITCH IN THE CASE OF FIRE. THEY ARE STILL SERVED BY FLORIDA POWER AND LIGHT CO. AND PROVIDE NO EMERGENCY SERVICE IN THE EVENT THE UTILITY SUPPLY FAILS DUE TO LOCAL STORM, HURRICANE OR NATIONAL EMERGENCY. THE FOLLOWING NINE SCHOOLS, EITHER COMPLETED OR UNDER CONSTRUCTION, FALL IN THIS CATEGORY:

HIALEAH JUNIOR - EARHART ELEMENTARY
RICHMOND HEIGHTS JUNIOR HIGH
MIAMI HEIGHTS ELEMENTARY
RICHMOND ELEMENTARY
VILLAGE GREEN ELEMENTARY
CHARLES R. DREW ELEMENTARY
PARKVIEW ELEMENTARY
EARLINGTON HTS. ELEM. ADD.
MIAMI SPRINGS SENIOR HIGH

THIS GROUP OF SCHOOLS IS THE PRIMARY REASON FOR THIS STUDY BECAUSE BY THE VERY NATURE OF THEIR COMPACT PLANNING FOR ECONOMICAL AIR CONDITIONING THEY INCLUDE IN MANY CASES INTERIOR ROOMS AND CORRIDORS WITHOUT NATURAL DAYLIGHT. IT WAS THE OCCASION OF HYSTERIA,WHICH MIGHT TRIGGER PANIC IN A SCHOOL OF THIS DESIGN,WHEN THE UTILITY COMPANY POWER SOURCE FAILED DURING A LOCAL STORM THAT PROMPTED THE STAFF AND BUILDING COMMITTEE TO CONSIDER EMERGENCY LIGHTING IN ADDITION TO THE PROVISIONS REQUIRED BY LAW.

EXCEPTIONS TO THIS GROUP AMONG THE AIR CONDITIONED SCHOOLS OR ADDITIONS BUILT SINCE THE ORIGINAL FIVE SCHOOLS IN THAT THEY DO HAVE EMERGENCY LIGHTING OVER AND ABOVE WHAT IS REQUIRED BY LAW ARE:

NORTH-WESTERN HIGH ADDITION (LIBRARY AND CLASSROOMS 1963)
ALLAPATTAH JUNIOR HIGH SCHOOL
MIAMI-DADE JUNIOR COLLEGE, HEALTH CENTER
MIAMI-DADE JUNIOR COLLEGE, LEARNING RESOURCES CENTER

THESE WILL BE DISCUSSED FURTHER UNDER EXISTING EMERGENCY SYSTEMS.

NATURALLY VENTILATED AND DAYLIGHTED SCHOOLS:

THE CONSIDERATION GIVEN TO ADDITIONAL EMERGENCY LIGHTING FOR STRUCTURES WHERE ARTIFICIAL LIGHTING IS PROVIDED FOR NORMAL DAYTIME USE HAS PROMPTED A SECOND LOOK AT THE SITUATION IN SCHOOLS ORIGINALLY DESIGNED PRIMARILY FOR DAYTIME USE, EMPLOYING NATURAL VENTILATION AND DAYLIGHT FOR LIGHT SOURCE. WITH ONLY OCCASIONAL NIGHT-TIME USE THE LEGAL REQUIREMENT FOR EMERGENCY LIGHTING BY SEPARATE CIRCUIT, A PROTECTION AGAINST FAILURE OF POWER WITHIN THE STRUCTURE, HAS BEEN CONSIDERED ADEQUATE. THE IMMEDIATE CONCERN IS FOR THOSE SCHOOLS IN THE SYSTEM WHERE CONTINUOUS NIGHT-TIME PROGRAMS ARE ALREADY IN PROGRESS WHICH FAR TRANSCEND THE ORIGINAL EXPECTATION OF ANNUAL OPEN HOUSE OR OCCASIONAL THEATRICAL OR CONCERT, GENERALLY INVOLVING ONLY THE AUDITORIUM. THIS GROUP HAS TWO SUB-DIVISIONS, THE LARGEST OF WHICH IS THE COMMUNITY SCHOOL PROGRAM ADMINISTERED BY LOUIS J. TASSE INCLUDING THE FOLLOWING SCHOOLS:

NORTH MIAMI JUNIOR HIGH	MADISON JUNIOR HIGH
NORLAND JUNIOR HIGH	PONCE DE LEON JUNIOR HIGH
IDA M. FISHER JUNIOR HIGH	BENJAMIN FRANKLIN ELEMENTARY
ADA MERRITT JUNIOR HIGH	MADIE IVES ELEMENTARY
MAYS JUNIOR AND SENIOR HIGH	R. R. MOTON ELEMENTARY
BOOKER T. WASHINGTON JUNIOR HIGH	G. W. CARVER JUNIOR & SENIOR HIGH

THIS PROGRAM HAS FOR ITS AIM THE INCLUSION OF ALL AGE GROUPS, CHILDREN AND ADULTS, AND MANY ACTIVITIES, CULTURAL AS WELL AS STRICTLY EDUCATIONAL IN THE USUAL SENSE. THE RESULT WILL BE THE USE OF THE ENTIRE FACILITIES AVAILABLE IN THE SCHOOL STRUCTURE IF THE PROGRAM ACHIEVES ITS GOALS. THE HOPE FOR THE FUTURE IS THE EXPANSION OF THE PROGRAM AND USE OF ADDITIONAL BUILDINGS.

WE KNOW THAT TWO OF THESE, NORTH MIAMI JUNIOR HIGH AND MAYS JUNIOR AND SENIOR HIGH, HAD PROVISIONS IN THEIR ORIGINAL DESIGN FOR EMERGENCY LIGHTING OF AUDITORIUMS BY MEANS OF LOCAL BATTERY POWERED UNITS. NEITHER OF THESE ASSEMBLY AREA SYSTEMS ARE FUNCTIONING AT THIS WRITING. THEIR CONDITION WILL BE DISCUSSED UNDER EXISTING SYSTEMS.

THE SECOND SUB-DIVISION OF THE GROUP IS THE NIGHT SCHOOL PROGRAM ADMINISTERED BY LOWELL B. SELBY AND AT THE PRESENT WRITING INVOLVES SEVEN HIGH SCHOOLS AS FOLLOWS:

HIALEAH HIGH
NORTH MIAMI HIGH
SOUTHWEST MIAMI HIGH
MIAMI SENIOR HIGH
MIAMI CENTRAL JUNIOR & SENIOR
MIAMI NORTHWESTERN HIGH
LINDSEY HOPKINS EDUCATIONAL CENTER

HERE ALSO THE PROGRAM MAY INVOLVE THE USE OF THE ENTIRE BUILDING WHERE THERE IS THE DEMAND AND CERTAINLY INVOLVES MORE NIGHT OPERATION THAN ANTICIPATED IN ORIGINAL CONCEPT WITH THE EXCEPTION OF LINDSEY HOPKINS.

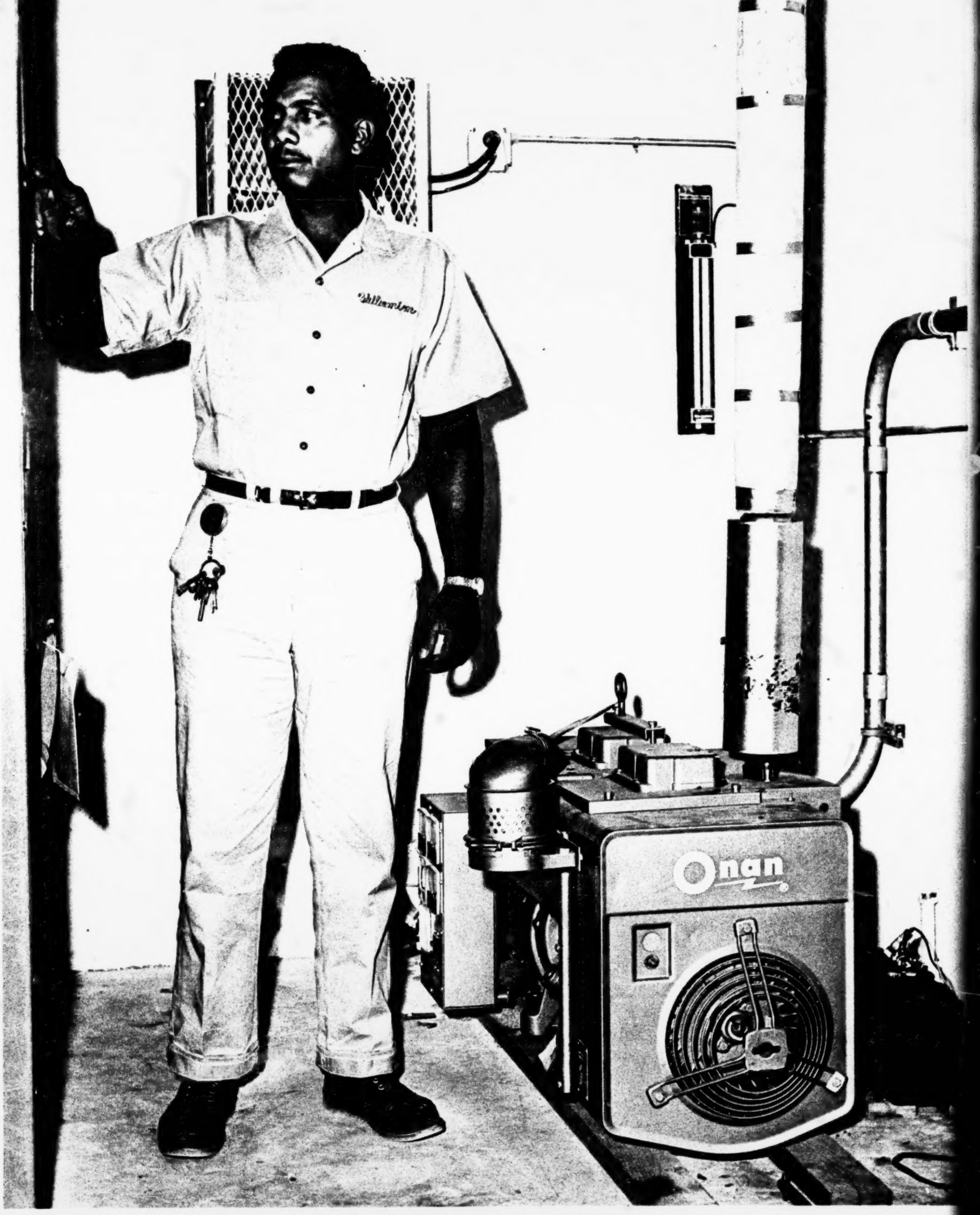
EXISTING EMERGENCY SYSTEMS:

ALL SCHOOLS IN THE SYSTEM ARE SUPPOSED TO HAVE AN EMERGENCY LIGHTING SYSTEM CONSISTING OF SEPARATE CIRCUITS FOR ILLUMINATED EXIT LIGHTS AND EMERGENCY LIGHTING IN PLACES OF ASSEMBLY AND CORRIDORS TO THE LEVEL OF ONE FOOT CANDLE SERVED BY THE PUBLIC UTILITY. EXCEPTIONS WOULD HAVE BEEN CONSTRUCTED PRIOR TO THE COUNTY BUILDING CODE OF 1935.

OTHER EXCEPTIONS UNDOUBTEDLY EXIST IN SCHOOL PLANTS WHICH HAVE BEEN ENLARGED BY FREQUENT ADDITIONS OVER THE YEARS WITHOUT A CONSISTENT POLICY OF EXTENDING THE SEPARATE CIRCUITS FOR EMERGENCY LIGHTING OF EXIT SIGNS, STAIRS AND PASSAGES IN THE PATH OF EXIT TO THE STREET.

IN ADDITION TO THIS MINIMUM REQUIRED BY LAW COMPLETE OR PARTIAL EMERGENCY SYSTEMS WERE OR ARE IN THE PROCESS OF BEING INSTALLED IN TWENTY SCHOOLS AND ADDITIONS TO OUR KNOWLEDGE AS FOLLOWS:

1. MIAMI-DADE JUNIOR COLLEGE, BUILDING "A"
2. GLADES JUNIOR HIGH
3. WEST DUNBAR ELEMENTARY
4. MIAMI CAROL CITY HIGH
5. MIAMI CORAL PARK HIGH
6. LINDSEY HOPKINS EDUCATION CENTER
7. MIAMI JACKSON JUNIOR AND SENIOR HIGH
8. CORAL GABLES SENIOR HIGH
9. NORTH MIAMI JUNIOR HIGH
10. MAYS JUNIOR AND SENIOR HIGH
11. PALM SPRINGS JUNIOR HIGH
12. NAUTILUS JUNIOR HIGH
13. PONCE DE LEON JUNIOR HIGH



THIS 15 KW GAS ENGINE DRIVEN ELECTRIC GENERATOR INSTALLED AT WEST DUNBAR ELEMENTARY SCHOOL, 750 N.W. 20 ST., MIAMI, ILLUSTRATES THE BEST TYPE OF EMERGENCY LIGHTING POWER SOURCE GENERALLY AVAILABLE LOCALLY FOR A COMPLETE COVERAGE OF REQUIREMENTS, MAKING USE OF EXISTING LIGHT FIXTURES AND WIRING OF EMERGENCY CIRCUITS. IN SCHOOLS WHERE SUCH CIRCUITS EXIST, THIS IS OUR FIRST RECOMMENDATION. CENTRALLY LOCATED UNIT MUST BE "EXERCISED" A MINIMUM OF ONCE A MONTH FOR THIRTY MINUTES BY THE CUSTODIAN.

14 RIVIERA JUNIOR HIGH
15 MIAMI NORTHWESTERN SENIOR HIGH ADDITION
16 ALLAPATTAH JUNIOR HIGH
17 WESTVIEW JUNIOR HIGH
18 MIAMI SPRINGS HIGH
19 MIAMI-DADE JUNIOR COLLEGE, HEALTH CENTER
20 MIAMI-DADE JUNIOR COLLEGE, LEARNING RESOURCES CENTER, BUILDING "B"

THERE MAY BE OTHERS WHICH HAVE NOT COME TO OUR ATTENTION.

THE FIRST FIVE OF THESE, THE AIR CONDITIONED SCHOOLS DESIGNED AS FALL-OUT SHELTERS, ARE EQUIPPED TO BE AUTOMATICALLY ACTUATED WHEN THE NORMAL POWER SOURCE FAILS. THE ONAN GENERATOR UNITS INSTALLED ARE INTENDED FOR THIS KIND OF SERVICE AND ARE AMONG THE BEST OFFERED BY THE INDUSTRY. PART OF THEIR RELIABILITY STEMS FROM THE USE OF GAS FUEL INSTEAD OF GASOLENE OR FUEL OIL. CONSEQUENTLY, THERE IS LESS TENDENCY TO CLOG THE CARBURATION SYSTEM WHEN THEY ARE IDLE.

THE SIXTH EMERGENCY SYSTEM, A STANDBY GENERATOR AT LINDSEY HOPKINS, HAS A DIESEL ENGINE. IT IS KEPT OPERATIVE BY WEEKLY START UP ROUTINE TO INSURE PERFORMANCE IN EMERGENCIES. THE SEVENTH EMERGENCY SYSTEM AT MIAMI JACKSON WAS 15 KW GENERATOR GASOLENE ENGINE DRIVEN, INSTALLED AT THE TIME THE PHYSICAL EDUCATION, HOME ECONOMICS AND SHOP BUILDINGS WERE BUILT IN 1947, IS PROBABLY TOO SMALL TO PROVIDE EMERGENCY POWER FOR THE ENTIRE PLANT. EVIDENCE IN THE RECORD DRAWINGS OF THE REWIRING DONE IN 1952 DOES NOT INDICATE THAT EMERGENCY WIRING CIRCUITS WERE PROVIDED THROUGHOUT TO WHICH A NEW LARGER GENERATOR COULD BE CONNECTED. THE EXISTING GENERATOR IS DISCONNECTED AND LONG UNUSED.

THE EIGHTHEMERGENCY SYSTEM DESIGNED TO PROVIDE EMERGENCY LIGHTING FOR THE AUDITORIUM ONLY AT CORAL GABLES SENIOR HIGH SCHOOL IS ALSO INOPERATIVE SINCE THE FAILURE OF THE TRANSFER SWITCH WHICH CONNECTED THE GASOLENE ENGINE POWERED GENERATOR AND ENERGIZED THE ENGINE STARTER ON THE FAILURE OF PUBLIC UTILITY POWER SOURCE. THIS SWITCH AND A STARTER BATTERY WOULD HAVE TO BE REPLACED TO MAKE THIS SYSTEM FUNCTION. IT WAS KEPT OPERATIVE BY WEEKLY STARTING ROUTINE LIKE LINDSEY HOPKINS UNTIL THE SWITCH FAILURE. INCIDENTLY, THE RECORD DRAWINGS SHOW A GENERATOR FOR THE CORRIDOR, STAIR AND EXIT LIGHTS FOR THIS ENTIRE SCHOOL SIMILAR TO THOSE IN THE FALL-OUT SHELTER SCHOOLS. IT WAS DOUBTLESS ELIMINATED FOR ECONOMY REASONS BEFORE CONSTRUCTION BEGAN.

THE NINTH AND TENTH SYSTEMS WERE BATTERY POWERED LOCAL UNITS INSTALLED AT NORTH MIAMI SENIOR HIGH AND MAYS JUNIOR AND SENIOR HIGH TO PROTECT AGAINST PANIC IN THE AUDITORIUM. AT NORTH MIAMI JUNIOR HIGH THEY COVER THE PASSAGE TO THE STREET. NEITHER IS IN OPERATING CONDITION, AND THEY WOULD REQUIRE REPLACEMENT BATTERIES AND POSSIBLY REPAIR OR REPLACEMENT OF CHARGERS WHERE RECTIFIERS ARE RUSTED AND RELAY CONTACTS CORRODED IN ORDER TO PUT THEM IN OPERATION. THE EQUIPMENT WAS SIMILAR TO WHAT WAS RECENTLY SPECIFIED AT NORTHWEST HIGH AND ALLAPATTAH JUNIOR HIGH.

SYSTEMS ELEVEN THROUGH FOURTEEN IN JUNIOR HIGH SCHOOL AUDITORIUMS AT PALM SPRINGS, NAUTILUS, PONCE DE LEON AND RIVIERA WERE EQUIPPED WITH BIG BEAM MODEL 2AD-5 OR 2ADS-MN 9 VOLT DRY CELL POWERED LOCAL UNITS MANUFACTURED BY U-C-LITE CO. REPLACEMENT OF BATTERIES AND POSSIBLE REPLACEMENT OF CONTROLS IS NECESSARY FOR THESE SYSTEMS TO FUNCTION.

THE FIFTEENTH AND SIXTEENTH EMERGENCY LIGHTING SYSTEMS AT NORTH-WESTERN HIGH LIBRARY AND CLASSROOM ADDITION, 1963, AND ALLAPATTAH JUNIOR HIGH PLANT CURRENTLY UNDER CONSTRUCTION HAVE, OR WILL HAVE WHEN COMPLETE, BATTERY POWERED LOCAL UNIT SYSTEMS. THESE ARE LOCATED IN LARGE ASSEMBLY AREAS AND AT STRATEGIC POINTS IN THE CORRIDORS. SENTRY-LITE MODEL SCR-X MANUFACTURED BY HOBBY & BROWN ELECTRONIC CORPORATION WAS SELECTED BY RALPH SELLS, THE ELECTRICAL ENGINEER FOR THESE PROJECTS. THESE UNITS ARE EQUIPPED WITH 100 AMPERE HOUR LEAD-ACID BATTERIES. SINCE THESE SYSTEMS INCLUDE NEITHER DUPLICATE NOR DUAL WIRED ILLUMINATED EXIT SIGNS, IT IS QUESTIONABLE WHETHER THEY QUALIFY AS TYPE I EMERGENCY LIGHTING UNDER THE NATIONAL BUILDING EXITS CODE OF THE NATIONAL FIRE PROTECTION ASSOCIATION WHICH IS PART OF THE SOUTH FLORIDA BUILDING CODE. THESE SCHOOLS MEET THE REQUIREMENTS OF THE CODE UNDER TYPE II EMERGENCY LIGHTING BY EMPLOYING SEPARATE CIRCUITS FOR EXIT SIGNS, STAIR AND PASSAGE LIGHTING CONNECTED AHEAD OF MAIN SWITCH AS STATED AT THE BEGINNING OF THIS SECTION. THE BATTERY LIGHTS SHOULD, HOWEVER, PROVIDE THE MINIMUM LIGHT FOR EVACUATION AS PROTECTION FROM PANIC WHICH IS OUR PRIMARY OBJECTIVE.

THE SEVENTEENTH SYSTEM IN WESTVIEW JUNIOR HIGH AUDITORIUM EMPLOYS LOW VOLTAGE FIXTURES AND CENTRALLY LOCATED RELAY SWITCH AND DRY CELLS.

THE EIGHTEENTH EXISTING SYSTEM CONSISTS OF PARTIAL COVERAGE LIMITED TO GYMNASIUM, AUDITORIUM AND CAFETERIA OF MIAMI SPRINGS SENIOR HIGH SCHOOL. EMERGENCY LIGHTING IS ACCOMPLISHED IN THESE AREAS BY MEANS OF LOCAL BATTERY UNITS DUAL-LITE #PC-20 NC CONTAINING NICKLE CADMIUM BATTERIES RATED FOR 75 WATTS FOR 1/2 HOUR

TO 91% OF RATED BATTERY VOLTAGE. THE UNITS ARE LOCATED IN THE NEAREST EQUIPMENT ROOM AND WIRED TO REMOTE ADJUSTABLE ANGLE RECESSED FIXTURES EQUIPPED WITH SEALED BEAM 50 CANDLE POWER LAMPS. NO PROVISION IS MADE IN THIS SUPPLEMENTARY SYSTEM FOR INTERIOR CORRIDORS OR WINDOWLESS TOILETS, DRESSING ROOMS, ETC.

THE POLICY OF PROVIDING EMERGENCY LIGHTING ESTABLISHED WITH BUILDING "A" AT MIAMI-DADE JUNIOR COLLEGE HAS BEEN CARRIED OUT IN THE CASE OF THE HEALTH CENTER. BECAUSE THE UTILITIES DISTRIBUTION SYSTEM HAS NOT BEEN DEVELOPED TO THE POINT WHERE THIS REMOTE BUILDING COULD BE ECONOMICALLY SERVED AT THIS TIME FROM THE EXISTING GENERATOR IN BUILDING "A", BATTERY POWERED LOCAL UNITS WERE EMPLOYED IN THE GYMNASIUM AS A CRITICAL LARGE ASSEMBLY AREA. OUR CONSULTANTS, DIGNUM ASSOCIATES, SPECIFIED DUAL-LITE MODEL #PC-40-NC WHICH HAS A NICKLE-CADMIUM BATTERY OF 40 AMPERE HOUR RATING. LOCATED ON THE BOTTOM CHORD OF THE ROOF TRUSSES THESE UNITS ARE RATHER INACCESSIBLE FOR SERVICE AT THE REQUIRED INTERVALS.

THE MIAMI-DADE JUNIOR COLLEGE LEARNING RESOURCES CENTER CURRENTLY UNDER CONSTRUCTION IS IN A LOCATION CLOSE ENOUGH TO BUILDING "A" WITH DUCTS AND MANHOLES FOR OTHER SERVICES BEING INSTALLED SO THAT CONSULTANTS OBOLER & CLARKE EXTENDED THE WIRING FROM THE ORIGINAL GENERATOR TO SERVE EXIT SIGNS, STAIR, EXIT PASSAGE LIGHTING, AND MINIMUM LIGHT LEVEL IN LARGE AREAS FOR ESCAPE PURPOSES. THIS EXTENSION EXHAUSTS THE AVAILABLE CAPACITY IN THE PRESENT GENERATOR AND FUTURE ADDITIONS WILL REQUIRE ADDITIONAL GENERATORS OR THE USE OF BATTERY UNITS LIKE THOSE IN THE HEALTH CENTER.

IT IS WORTH NOTING IN PASSING THAT IN THE CASE OF MIAMI-DADE JUNIOR COLLEGE THE PUBLIC UTILITY CAN SERVE THE ENTIRE FACILITY BY EITHER OF ONE OF TWO SEPARATE DISTRIBUTION SYSTEMS. SINCE THE SECOND OR ALTERNATE SOURCE COULD BE AUTOMATICALLY CONNECTED BY A TRANSFER SWITCH ON THE FAILURE OF THE FIRST, THIS WOULD QUALIFY THE ENTIRE INSTALLATION FOR RATING AS TYPE III EMERGENCY LIGHTING.

NEED FOR ADDITIONAL EMERGENCY FACILITIES:

THE OCCASIONS WHEN THE NEED FOR ADDITIONAL POWER SOURCE IS INDICATED ARE THOSE TIMES WHEN THE NORMAL PUBLIC UTILITY SUPPLY IS INTERRUPTED BY HURRICANE, LOCAL STORM, OR NATIONAL EMERGENCY. FEW DIRECT HITS AND BETTER WARNING SYSTEM HAS TENDED TO MAKE US INCREASINGLY COMPLACENT ABOUT HURRICANES, BUT THEY REMAIN A REAL THREAT. IN THE PAST, SCHOOLS HAVE DONE YEOMAN SERVICE AS SHELTERS. THE LOCAL THUNDERSTORM AND TORNADO WE ALWAYS HAVE

WITH US. OUR NEWER SCHOOLS IN REMOTE AREAS OF THE COUNTY ARE PARTICULARLY VULNERABLE BECAUSE THE POWER LINES ARE LESS APT TO BE CROSS CONNECTED IN A GRID. CONSEQUENTLY, THE LOSS OF TRANSFORMERS IN STORM OR WINTER SEASON OVERLOAD IS MORE APT TO AFFECT THEM. NATIONAL EMERGENCY WITH MISSILE BASES ALL AROUND US NEEDS NO FURTHER COMMENT.

GRANTED THAT FAILURE OF OUR PRESENT EMERGENCY PROVISIONS CAN OCCUR ON THE OCCASIONS LISTED ABOVE, WHAT ARE THE CONSEQUENCES? FIRST OF THESE HAS ALREADY MENTIONED, NAMELY PANIC, THAT MASS HYSTERIA WHICH GRIPS PEOPLE IN CROWDS AND MAY RESULT IN INHUMAN BEHAVIOR WITH DEATH AS WELL AS INJURY THE CONSEQUENCES. EVEN WITHOUT PANIC THERE IS SERIOUS DANGER OF ACCIDENTS WHEN PEOPLE ARE SUDDENLY PLUNGED INTO TOTAL DARKNESS.

AT PRESENT WE ARE FACED WITH A MORAL OBLIGATION TO PROVIDE ADDITIONAL EMERGENCY LIGHTING PROVISIONS TO THOSE REQUIRED BY CODE. THERE IS ALWAYS THE POSSIBILITY OF ADDITIONAL REQUIREMENTS BEING IMPOSED BY THOSE IN AUTHORITY AS THEY ARE IN SOME PARTS OF THE COUNTRY. THE BUILDING EXITS CODE NFPA NO. 101 WHICH IS A PART OF THE SOUTH FLORIDA BUILDING CODE BY REFERENCE SAYS EMERGENCY LIGHTING SHALL BE PROVIDED "SUBJECT TO THE APPROVAL OF THE ENFORCING AUTHORITY". PURSUIT OF THE IMPLICATIONS OF THIS PROVISION OF THE CODE PRODUCED FROM MAX GOLDFARB, CHIEF ELECTRICAL INSPECTOR FOR DADE COUNTY BUILDING AND ZONING DEPARTMENT AND CHAIRMAN OF A CODE REVISION COMMITTEE FOR REVISION OF THE CODE WHICH INCLUDES REPRESENTATIVES OF THE CITIES, INDICATES THE FOLLOWING:

1. INASMUCH AS THE SCHOOLS ALREADY COMPLY WITH TYPE II EXIT LIGHTING ACCORDING TO THE BUILDINGS EXITS CODE , DUAL EXIT LIGHTS ILLUMINATED BY AUXILIARY POWER SOURCE WILL NOT BE REQUIRED AS LONG AS THE AUXILIARY LIGHTS INSTALLED ILLUMINATED THE EXISTING SIGNS.

2. FOR THE SAME REASON, THE NUMBER OF EMERGENCY LIGHTS ADDED TO THE EXISTING FACILITIES WOULD BE AT THE DISCRETION OF THE OWNER'S ENGINEERS AS LONG AS ILLUMINATION AT THE PLACES OF ASSEMBLY OVER 200 AND EXIT PASSAGE TO THE STREET WERE PROVIDED.

3. EMERGENCY LIGHTING UNITS POWERED BY DRY CELLS WOULD NOT BE ACCEPTABLE BECAUSE OF FALSE SECURITY PROVIDED INASMUCH AS CONTINUED SERVICE DEPENDS ON REPLACEMENT AFTER AN EMERGENCY.

4. UNDERWRITERS APPROVED EQUIPMENT WHEN AUXILIARY LIGHTING IS INSTALLED IN ADDITION TO REQUIREMENTS WOULD BE REQUIRED. THIS INCLUDES A PILOT LIGHT OR AUDIBLE SIGNAL TO INDICATE MALFUNCTION.

5. NATIONAL ELECTRICAL CODE REQUIRES THAT THE UNITS BE PERMANENTLY WIRED TO THE BUILDING RATHER THAN PLUGGED INTO A CONVENIENCE OUTLET. THIS WILL BE REQUIRED BY LOCAL AUTHORITIES.

CONSULTATION WITH MR. KENNEDY OF THE CITY OF MIAMI FIRE PREVENTION BUREAU AFFIRMED THAT HE WAS IN AGREEMENT WITH THE STATEMENTS MADE BY MR. GOLDFARB.

A CONSIDERATION NOT TO BE OVERLOOKED IS THE PROTECTION OF PROPERTY BY MAINTAINING NIGHT LIGHTS AS PROTECTION AGAINST VANDALISM AND THEFT. THESE COULD BE CONCEIVABLY MORE PREVALENT WHEN THERE IS A FAILURE OF THE NORMAL POWER SOURCE.

RECOMMENDED EMERGENCY LIGHTING SERVICE:

THE BEST TYPE OF ELECTRICAL CURRENT FOR EMERGENCY LIGHTING IS A PUBLIC UTILITY MADE RELIABLE BECAUSE OF UNDERGROUND WIRING AND NETWORK SUPPLIED THROUGH SEPARATE SUB-STATIONS. IN SOME PLACES THERE MAY BE TWO SEPARATE ELECTRIC SUPPLY SYSTEMS AVAILABLE, PERMITTING AN ALTERNATE SOURCE WITH FURTHER INCREASE IN RELIABILITY. THE FIRST OF THESE IS DENIED US IN MOST OF THE COUNTY BY THE FLORIDA POWER AND LIGHT CO. POLICY OF OVERHEAD DISTRIBUTION SERVICE IN MOST RESIDENTIAL AREAS, AND THE FRANCHISE GRANTED THEM RULES OUT ANY ALTERNATE SOURCE. WE HAVE ALREADY NOTED THE EXCEPTION IN THE CASE OF MIAMI-DADE JUNIOR COLLEGE WHERE TWO DISTRIBUTION SYSTEMS ARE POSSIBLE. THE EFFECTIVENESS OF SUPER-VISION AND MAINTENANCE MAKES THE PUBLIC UTILITY THE FIRST CHOICE FOR THE PRIMARY SOURCE FOR EMERGENCY LIGHTING WHEN UNDERGROUND WIRING AND SEPARATE SUB-STATIONS OR SUPPLY SYSTEMS ARE AVAILABLE EVEN THOUGH SUBJECT TO NATURAL CATASTROPHE, ACT OF WAR OR SABOTAGE.

SECOND BEST TYPE IS AN ELECTRIC GENERATOR POWER SOURCE EITHER WITH A SEPARATE WIRING SYSTEM OPERATING AT THE SAME TIME AS THE OUTSIDE SOURCE, OR SO ARRANGED THAT IT WILL COME AUTOMATICALLY AND IMMEDIATELY INTO OPERATION ON THE FAILURE OF THE OUTSIDE SOURCE OF POWER FOR EMERGENCY LIGHT CIRCUITS SUCH AS WERE INSTALLED IN THE FALL-OUT SHELTERS AND MIAMI-DADE JUNIOR COLLEGE.

THIRD BEST TYPE IS ELECTRIC CIRCUITS USED ONLY FOR EMERGENCY ILLUMINATION, CONNECTED WITH TWO INDEPENDENT ELECTRIC SOURCES SO ARRANGED THAT ON THE FAILURE OF THE PUBLIC UTILITY THE ALTERNATE,

AN APPROVED STORAGE BATTERY WITH SUITABLE PROVISIONS TO KEEP IT AUTOMATICALLY CHARGED, COMES AUTOMATICALLY AND IMMEDIATELY INTO OPERATION. THERE ARE TWO TYPES OF BATTERY INSTALLATION: THE CENTRAL SYSTEM WITH A BANK OF BATTERIES AND ONE CHARGER CONNECTED TO A NUMBER OF LIGHTS AND THE MORE FAMILIAR UNIT DEVICES WITH ONE, TWO, THREE, OR AT MOST FOUR HEADS OR LIGHTS CONNECTED TO THE UNIT OF BATTERY AND CHARGER. CENTRAL SYSTEMS ARE AVAILABLE IN 6 VOLT, 32 VOLT AND 110 VOLT SYSTEMS. UNIT SYSTEMS ARE GENERALLY 6 VOLT. BROWARD COUNTY HAS EMPLOYED BOTH OF THESE TYPES TO SUPPLEMENT THE PUBLIC UTILITY.

REGARDLESS OF PREVIOUS POLICY DECISIONS THAT MAY HAVE BEEN MADE TO THE CONTRARY, WE STRONGLY RECOMMEND AS FIRST CHOICE THE SECOND BEST TYPE OF EMERGENCY SYSTEM USING AN ELECTRIC GENERATOR FOR POWER SOURCE FOR THOSE SCHOOLS IN THE AIR CONDITIONED GROUP, BUILT BY THE SAME CRITERIA AS THE ORIGINAL FALL-OUT SHELTERS. (THE FIRST TYPE OF CURRENT AS STATED PREVIOUSLY IS NOT GENERALLY OPEN TO US BECAUSE OF LOCAL CONDITIONS GOVERNED BY FLORIDA POWER AND LIGHT CO. POLICY). THIS RECOMMENDATION IS BASED ON THE FOLLOWING FACTS: FIRST, 110 VOLT WIRING AND FIXTURES ARE ALREADY INSTALLED FOR EMERGENCY EXIT ILLUMINATION WHICH INCLUDES ILLUMINATED EXIT SIGNS, MINIMUM LIGHT LEVEL IN ASSEMBLY AREAS, PATHS OF EXIT, STAIRS AND INSIDE TOILETS. SECOND, LOCATION AND UTILITIES WERE PROVIDED FOR ENGINE DRIVEN GENERATOR SETS AND ALSO TRANSFER SWITCHES INSTALLED FOR THEIR CONNECTION TO THE EMERGENCY EXIT ILLUMINATION IN SOME CASES. THIS METHOD WOULD NOT INVOLVE DEFACING NEW BUILDINGS TO INSTALL LOW VOLTAGE D.C. WIRING AND FIXTURES PARALLEL TO THE EXISTING SYSTEM, OR TO CLUTTER UP THE WALLS WITH BATTERY AND CHARGER UNITS. EVEN THOUGH THE CENTRAL BATTERY SYSTEM WOULD HAVE ACCEPTABLE APPEARANCE, IT INVOLVES FINDING SPACE FOR BANKS OF BATTERIES REASONABLY CLOSE TO THE FIXTURES SERVED BECAUSE OF THE HIGH VOLTAGE DROP OF LOW VOLTAGE SYSTEMS AND OF THE COST OF LARGER WIRE SIZES. IF EQUAL COVERAGE IS PROVIDEDBOTH BATTERY SYSTEMS INVOLVE A HIGHER REPLACEMENT FACTOR THAN INVOLVED IN A SINGLE ENGINE DRIVEN GENERATOR AT ONE LOCATION WITH WATER TO BE ADDED TO, OR PERIODIC REPLACEMENT OF ONLY THE STARTER BATTERY.

TO DO A COMPARABLE JOB OF ILLUMINATION TO THAT PROVIDED BY THE EXISTING EMERGENCY CIRCUITS AND FIXTURES BY USING LOW VOLTAGE FIXTURES, NICKLE CADMIUM BATTERIES WITH 10 YEAR GUARANTEE, AND CHARGERS IN SMALL UNITS OF THE TYPE RECOMMENDED BY THE MANUFACTURERS, WE ESTIMATE VERY ROUGHLY WILL EXCEED THE COST OF THE MOTOR GENERATOR FOR HIALEAH JUNIOR HIGH AND EMILIA EARHART ELEMENTARY. THE INITIAL COST CAN BE REDUCED BY GOING TO SEALED LEAD ACID, OR TO FIVE YEAR GUARANTEE LEAD ACID WHERE WATER MUST BE ADDED FREQUENTLY, EACH REDUCTION IN COST IS ACCOMPANIED BY AN INCREASE IN MAINTENANCE FREQUENCY AND REPLACEMENT.

FURTHER REDUCTION IN INITIAL COST CAN BE AFFECTED BY REDUCING THE AMOUNT OF LIGHTING PROVIDED BY THE BATTERY SYSTEM AS COMPARED TO STANDARD VOLTAGE EMERGENCY CIRCUITS ALREADY INSTALLED. UNDER "NEED FOR ADDITIONAL EMERGENCY FACILITIES" WE NOTED THAT THE GOVERNING AUTHORITIES WILL NOT REQUIRE US TO DUPLICATE SELF-ILLUMINATED SIGNS OR PROVIDE EMERGENCY LIGHT EXCEPT IN AREAS ACCOMMODATING OVER 200 PERSONS. THEREFORE, EXIT SIGNS, TOILET LIGHTS, AND ROOMS ACCOMMODATING LESS THAN 200 WOULD BE ELIMINATED FROM PROVISIONS FOR EMERGENCY LIGHTING. IN THE CASE OF ALLAPATTAH JUNIOR HIGH, TEN LOCAL LEAD ACID BATTERY TYPE UNITS WERE REQUIRED TO PROVIDE THIS REDUCED COVERAGE OF LARGE ASSEMBLY AREAS AND PRINCIPAL CORRIDORS ONLY. THE APPROXIMATE COST OF THE EQUIPMENT ALONE WAS $1,200.00 IN THIS CASE OF A COMPACT PLANT. ADDITIONAL EXPENSE FOR THE CONNECTION TO THE UTILITY POWER SOURCE FOR RECHARGING AND SIGNALING THE EMERGENCY SYSTEM WHEN THAT SOURCE FAILS SHOULD NOT EXCEED $25.00 A PIECE OR $250.00. THUS, THE ENTIRE SYSTEM ON THIS REDUCED BASIS CAN BE INSTALLED FOR UNDER $1,500.00 AS COMPARED TO $2,837.98 FOR 30 KW MOTOR GENERATOR ALONE, REQUIRED FOR A SCHOOL THIS SIZE, NOT INCLUDING INSTALLATION EXPENSE. IT IS REASONABLE TO ASSUME THAT A COMPARABLE SAVINGS WOULD BE REFLECTED IN ELEMENTARY SCHOOLS EVEN THOUGH A SMALLER GENERATOR WAS USED OF 15 KW IN THE FALL-OUT SHELTERS COSTING $1,964.18 WITHOUT INSTALLATION. THE NUMBER OF BATTERY UNITS REQUIRED WOULD ALSO BE LESS THAN USED AT ALLAPATTAH IN MOST CASES. THEREFORE, JUDGED STRICTLY ON THE BASIS OF ECONOMY, WE MUST CONCEDE THAT LOCAL BATTERY POWERED EMERGENCY UNITS MUST BE GIVEN CONSIDERATION IF WE IGNORE AESTHETIC APPEARANCE AND EXTENT OF COVERAGE PROVIDED.

FOR SCHOOLS IN THE SECOND AND THIRD GROUPS USED AT NIGHT FOR COMMUNITY SCHOOLS OR NIGHT SCHOOL, THE RECOMMENDATION TO INSTALL A GENERATOR DOES NOT APPLY SO READILY. BUILT OVER A LONG PERIOD OF YEARS BY A NUMBER OF DIFFERENT CRITERIA, THEIR DESIGN VARIES SO MUCH FROM ANY NORM THAT EACH CASE MUST STAND ON ITS OWN MERITS. WE CANNOT ALWAYS RELY ON AN EXISTING EMERGENCY CIRCUIT OR CIRCUITS TO WHICH WE CAN EASILY ADD A TRANSFER SWITCH AND MOTOR GENERATOR. THE SPREAD OUT NATURE OF THE PLANS AND FREQUENT INCIDENTS OF LATER ADDITIONS IN SOME INSTANCES MAKES THE REWIRING TO ACHIEVE AN EMERGENCY LIGHTING CIRCUIT FROM A CENTRAL POINT AN EXPENSIVE UNDERTAKING. A CONSITANT POLICY OF PROVIDING EMERGENCY LIGHTING IN EXIT-WAYS AS WELL AS ILLUMINATED EXIT SIGNS HAS NOT ALWAYS BEEN FOLLOWED, BECAUSE THE PRESENT NEED FOR FULL NIGHT TIME USE COULD NOT BE FORESEEN. HOWEVER, IN THOSE INSTANCES WHERE INVESTIGATION REVEALS THAT AN ADEQUATE EMERGENCY SYSTEM EXISTS IN THE PRESENT WIRING, AS FOR EXAMPLE AT CORAL GABLES SENIOR HIGH, THE INSTALLATION OF A MOTOR GENERATOR CONNECTED BY A TRANSFER SWITCH PROVIDES THE CLEANEST LOOKING INSTALLATION.

OUR RECOMMENDATION AS SECOND CHOICE, AND POSSIBLY THE ONLY FEASIBLE SOLUTION FOR MANY OLDER SCHOOLS WITH INADEQUATE EMERGENCY LIGHTING CIRCUITS, SERVING ASSEMBLY AREAS, AND EXIT WAYS IS THE THIRD BEST TYPE OF SYSTEM USING LOCAL BATTERY UNITS MOUNTED AT OR NEAR THE LIGHT FIXTURE AND READILY ACCESSIBLE FOR FREQUENT SERVICE. AS STATED PREVIOUSLY, THESE MAKE AN UNSIGHTLY APPEARANCE, YET MUST BE LOCATED NEAR THE EMERGENCY LIGHT SERVED TO KEEP DOWN THE VOLTAGE DROP. IN FUTURE CONSTRUCTION THEY COULD BE RECESSED OR LOCATED IN CLOSETS OUT OF SIGHT WHERE THIS IS POSSIBLE. THESE UNITS MANUFACTURED SPECIFICALLY FOR THIS SERVICE ARE AVAILABLE WITH ONE OR TWO AND EVEN THREE ADJUSTABLE LAMPS, SPOT OR WIDE ANGLE LENSES, FULLY ENCLOSED BATTERY CASES. TWO RATE FULLY AUTOMATIC CHARGERS AND REMOTE LOW VOLTAGE LIGHTING FIXTURES ARE AVAILABLE WHICH CAN BE CONNECTED TO THE UNIT WITHIN A REASONABLE DISTANCE (AVERAGE 25 FEET). REMOTE FIXTURES WIRED TO UNITS INSIDE THE BUILDING SHOULD BE USED WHEN EMERGENCY LIGHT IS REQUIRED FOR OPEN CORRIDORS TO FORESTALL THEFT OR VANDALISM OF THE UNITS.

SOME ENGINEERS RECOMMEND NICKLE CADMIUM BATTERY UNITS FOR THIS SERVICE. THE EMERGENCY LIGHTING MANUFACTURERS ISSUE A WARRANTY FOR TEN YEARS ON A PRO-RATED BASIS SUBJECT TO PROPER MAINTENANCE AND CLAIM THEY MAY LAST TWENTY (20) OR MORE YEARS ON THIS TYPE OF BATTERY. MOST BATTERY MANUFACTURERS WILL NOT GUARANTEE THEIR PRODUCT FOR MORE THAN A YEAR, HOWEVER, AGAINST FAILURE OF WORKMANSHIP OR MATERIALS. THEIR LIFE EXPECTANCY IS PREDICTED ON ACCURATE CALIBRATION OF CHARGER IN THE UNIT AFTER INSTALLATION WHICH IS UNLIKELY TO BE OBTAINABLE. SINCE IT TAKES FIVE (5) CELLS INSTEAD OF THREE (3) CELLS TO OBTAIN 6 VOLTS WITH NICKLE CADMIUM TYPE, THEY ARE LARGER THAN LEAD ACID BATTERIES OF EQUAL CAPACITY. FOR THIS SERVICE THEY ARE OFFERED IN ONLY 30 OR 40 AMPERE HOUR CAPACITY. THE PRINCIPAL ADVANTAGES OF NICKLE CADMIUM ARE FIRST, THAT THEY CAN WITHSTAND NEGLECT OF WATER LEVEL WITHOUT PERMANENT DAMAGE TO A GREATER EXTENT THAN LEAD-ACID, ALTHOUGH LOW LEVEL, OF COURSE, REDUCES CAPACITY AVAILABLE. SECOND ADVANTAGE IS THAT THEY CAN WITHSTAND MORE OVERCHARGE WITH LESS PERMANENT DAMAGE. THE HIGH INITIAL COST FOR GOOD NICKLE CADMIUM BATTERIES, ROUGHLY THREE TIMES THE COST OF LEAD-ACID BATTERIES, IS NOT JUSTIFIED BY THEIR PERFORMANCE IN ACTUAL USE ACCORDING TO SOME EVIDENCE RECEIVED. THE HIGH CAPITAL INVESTMENT COULD ONLY BE JUSTIFIED ON THE GROUNDS OF VERY POOR MAINTENANCE BEING AVAILABLE.

OUR RECOMMENDATION FOR LOWER INITIAL COST COMBINED WITH LEAST MAINTENANCE IS A NEW LEAD-ACID SEALED BATTERY WITH A "PROJECTED" LIFE OF SEVEN (7) YEARS. ONE MANUFACTURER, "EXIDE", OFFERS THIS IN THEIR MODEL "F" UNIT. THE GUARANTEE OF THE UNIT, WHICH IS THE

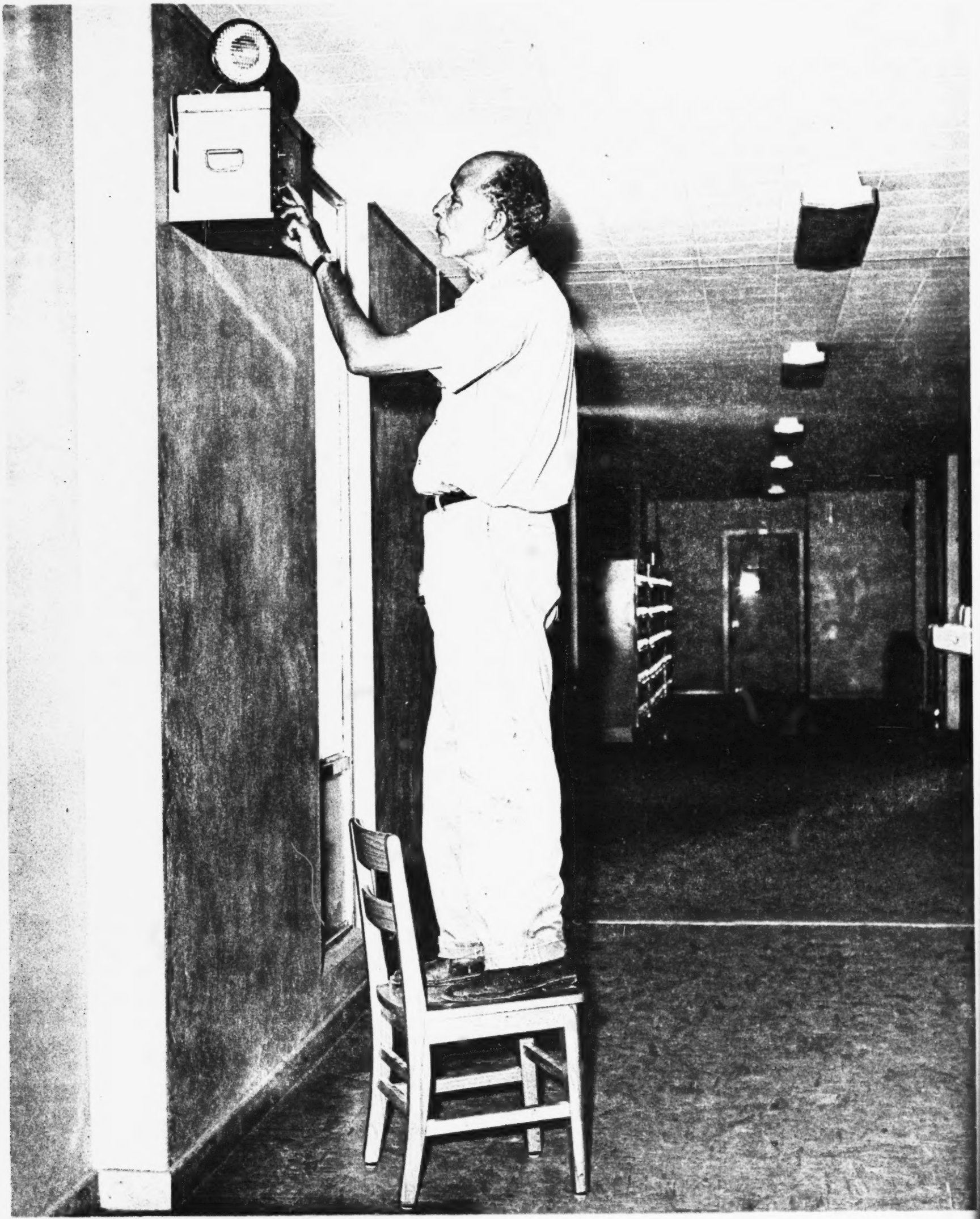
ONLY ONE ENGINEERED TO USE THIS NO-MAINTENANCE BATTERY, IS FOR ONE YEAR AGAINST DEFECT IN WORKMANSHIP AND MATERIALS. THE ANTICIPATED LIFE IS DEPENDENT UPON A RESERVOIR OF ELECTROLYTE ABOVE THE PLATES. ONCE THIS IS EXHAUSTED THROUGH THE VENTS AS HYDROGEN AND OXYGEN, THE BATTERY MUST BE REPLACED. A FAILURE OF THE RELAY CUTTING OFF THE HIGH RATE OF CHARGE COULD TERMINATE THE "PROJECTED" LIFE PREMATURELY. THE CAPACITY OF THIS BATTERY IS ONLY 30 AMPERE HOURS. IT USES LEAD-CALCIUM RATHER THAN LEAD ANTIMONY PLATES, THEREFORE REQUIRES LESS CURRENT TO MAINTAIN FULL CHARGE. THIS MODEL WAS SELECTED BY MANATEE JUNIOR COLLEGE, BRADENTON, FLORIDA. A GREAT NUMBER HAVE BEEN SOLD TO FORD MOTORS AND GENERAL MOTORS COMPANIES.

AN ALTERNATIVE TO THE EXIDE MODEL "F", AVAILABLE FROM SEVERAL SOURCES, WOULD BE A UNIT STANDARD IN THE INDUSTRY FOR MANY YEARS. THIS WOULD BE POWERED WITH LEAD-ACID BATTERY OF 100 AMPERE HOUR CAPACITY IN GLASS OR PLASTIC CASE. THE UNIT WOULD CONTAIN A FULLY AUTOMATICALLY CONTROLLED TWO (2) RATE CHARGER. THE TRANSFER RELAY WOULD BE CAPABLE OF ENERGIZING A TOTAL OF FIVE (5) TWENTY-FIVE (25) WATT LAMPS OR HEADS, AND THE CHARGING RELAY WOULD BE HERMETICALLY SEALED. LAMPS WOULD BE G. E. SEALED BEAM #4013 FLOOD FOR ASSEMBLY ROOMS AND #4535 SPOT FOR CORRIDORS.

GUARANTEE REQUIRED WOULD BE FOR ONE YEAR FOR UNIT WORKMANSHIP AND MATERIAL WITH 5-YEAR WARRANTY PRO-RATED ON THE BATTERY. BATTERY CELL CAPS PREFERABLY SHOULD BE HYDRO-CATYLATORS WHICH BY CHEMICAL CATALYST CONVERT HYDROGEN AND OXYGEN GIVEN OFF BY THE ELECTROLYTE. THIS REDUCES THE FREQUENCY THAT DISTILLED WATER MUST BE ADDED AND REDUCES THE DANGER OF EXPLOSION OF HYDROGEN GAS.

BECAUSE OF THE HIGHLY SPECIALIZED NATURE OF THIS EQUIPMENT, WE RECOMMEND THAT ONLY FIRMS WITH TEN YEARS EXPERIENCE IN THE FIELD BE CONSIDERED ELIGIBLE TO BID ON EQUIPMENT WITH PILOT LIGHT INDICATOR AND UNDERWRITER APPROVED TO MEET CODE REQUIREMENTS, SUCH AS THE FOLLOWING:

MODEL	BRAND	MANUFACTURER
FA 100L	BIG BEAM	U-C-LITE
88 WDV	LIGHT WARDEN	ELECTRIC CORD CO.
PC-100-LC	DUAL LITE	DUAL-LITE CO., INC.
E 63 702	LIGHTGUARD	EXIDE DIVISION ELECTRIC STORAGE BATTERY CO.
SCR -200 X	SENTRY-LITE W/CELLOMATIC	HOBBY & BROWN ELECTRONIC CORP.



THIS STORAGE BATTERY POWERED SELF-CONTAINED UNIT LOCATED IN THE AIR CONDITIONED WING OF MIAMI NORTHWESTERN HIGH AT 7007 N.W. 12 AVE., MIAMI, IS THE TYPE OF EMERGENCY LIGHTING RECOMMENDED FOR MINIMUM COVERAGE OF ASSEMBLY AREAS FOR OVER 200 PERSONS AND PASSAGES IN THOSE SCHOOLS WHERE EXISTING EMERGENCY CIRCUIT WIRING TO REGULAR LIGHTING FIXTURES IS INADEQUATE FOR USING A GENERATOR WITHOUT EXTENSIVE REWIRING. THIS MODEL REQUIRES CHECKING THE BATTERY WATER LEVEL IN EACH UNIT EVERY TWO MONTHS.

WE FURTHER RECOMMEND THAT, ALTHOUGH NO LABORATORY TESTS CAN SIMULATE EXACTLY THE DETERIORATION WHICH OCCURS BECAUSE OF THE TIME AND WEATHER ELEMENT, THAT THE MAINTENANCE DEPARTMENT TEST LABORATORY UNDERTAKE TO TEST THE RELIABILITY OF BATTERIES, CHARGERS, AND PARTICULARLY CONTROL CIRCUITS OF THE BRANDS CONSIDERED FOR PURCHASE. THEIR COLLABORATION IN THE PREPARATION OF BID SPECIFICATIONS WOULD UNDOUBTEDLY BE OF VALUE IN ELIMINATION OF UNSATISFACTORY EQUIPMENT FROM CONSIDERATION FOR PURCHASE PROVIDED THEIR SCHEDULE WILL PERMIT.

WE DO NOT FEEL THAT MANUALLY OPERATED FAST CHARGERS SHOULD BE CONSIDERED BECAUSE OF THE HUMAN ELEMENT INVOLVED. UNITS ARE ALSO OFFERED WITH TRICKLE CHARGER ONLY. SINCE THESE MAY REQUIRE AS MUCH AS SIX WEEKS TO RESTORE THE BATTERY AFTER POWER FAILURE, WE DO NOT CONSIDER THAT THEY OFFER ADEQUATE PROTECTION IN THE EVENT OF SUBSEQUENT NORMAL POWER SOURCE FAILURE SOON AFTER THE FIRST ONE. EVEN IF DRY CELL BATTERIES WERE NOT RULED OUT BY LOCAL AUTHORITIES, THEY HAVE THE SAME SHORTCOMING INSOFAR AS POWER FAILURE SPACED SO CLOSE THAT BATTERIES COULD NOT BE REPLACED, PLUS DECLINING CAPACITY TOWARDS THE END OF THEIR LIFE.

ASIDE FROM OBJECTIONABLE APPEARANCE, THE BATTERY POWERED EMERGENCY LIGHTING SYSTEMS DO HAVE DISTINCT ADVANTAGES. ONE OF THESE IS RELATIVE SIMPLICITY OF MECHANISM WITH FEW MOVING PARTS AS COMPARED TO AN ENGINE DRIVEN GENERATOR SET SO THAT ASIDE FROM CONTROLS THEY CAN BE MAINTAINED BY UNSKILLED PERSONNEL. ANOTHER IS DIVERSITY; SINCE IT IS LESS LIKELY THAT ALL OF THE UNITS WOULD FAIL BECAUSE THEY ARE ENTIRELY INDEPENDENT OF ONE ANOTHER, AN ADJOINING UNIT MIGHT PROVIDE THE CRITICAL MARGIN OF SAFETY IN SPITE OF THE ISOLATED FAILURE OF ONE UNIT.

MAINTENANCE COMPARISON:

NO ACTUAL TIME STUDIES ARE AVAILABLE FOR THE MAINTENANCE OF EQUIPMENT UNDER CONSIDERATION. THEREFORE, WE CAN ONLY ROUGHLY ESTIMATE THE COSTS ON THE BASIS OF MANUFACTURER'S RECOMMENDATIONS OF FREQUENCY THAT SERVICE IS REQUIRED.

IN THE CASE OF OUR FIRST RECOMMENDATION FOR AIR CONDITIONED SCHOOLS AND OLDER SCHOOLS, AS WELL AS WHERE EXISTING EMERGENCY WIRING CIRCUITS PERMIT, NAMELY GAS ENGINE DRIVEN GENERATORS, THE RECOMMENDATION IS THAT THE MACHINE BE "EXERCISED" A MINIMUM OF ONCE A MONTH FOR THIRTY MINUTES. BESIDES MAKING SURE THAT EVERYTHING IS IN "READY" CONDITION, THIS LUBRICATES THE ENGINE TO PREVENT IT FROM RUSTING FROM DISUSE. ALLOWED TO RUN THIS

LONG, IT RECHARGES THE STARTING BATTERY AND GETS NOT ENOUGH TO EVAPORATE CRANK CASE CONDENSATION. EVEN THOUGH IT WOULD NOT BE NECESSARY FOR THE CUSTODIAN TO STAND BY AFTER STARTING THE GENERATOR IF WE CAN CHARGE THIRTY MINUTES TIMES TWELVE MONTHS, THIS WOULD BE SIX HOURS. AT $1.50 PER HOUR THIS WOULD BE $ 9.00 PER YEAR. A FACTORY APPROVED SERVICE AGENT TESTIFIES THAT SIMILAR EQUIPMENT COSTS LESS THAN $60.00 FOR SERVICE CALLS IN THREE YEARS. THIS WOULD YIELD AN AVERAGE OF $20.00 A YEAR FOR ADJUSTMENT BY SKILLED MECHANICS INCLUDING SMALL PARTS. ASSUMING A STARTER BATTERY AT $30.00 WOULD REQUIRE REPLACEMENT AFTER THREE YEARS, THE ANNUAL COST WOULD BE $10.00. THE INTEREST ON THE CAPITAL INVESTMENT FOR 30 KW MOTOR GENERATOR REQUIRED FOR SENIOR HIGH OR COMBINED SCHOOLS AT 6% WOULD BE $2,837.98 TIMES .06 OR $ 170.27. SINCE THIS IS ENTIRELY A STAND-BY OPERATION, AND THE GENERATOR WOULD NOT BE OPERATED FOR ANY LENGTH OF TIME, IT IS ASSUMED THAT MAJOR OVERHAUL WOULD NOT BE REQUIRED FOR THIS EQUIPMENT.

IN THE CASE OF OUR SECOND CHOICE RECOMMENDATION FOR AIR CONDITIONED SCHOOLS, AND THE ONLY PRACTICAL SOLUTION FOR OLDER SCHOOLS WITHOUT EXISTING EMERGENCY LIGHT CIRCUITS, WE WILL TAKE ALLAPATTAH JUNIOR HIGH AS REPRESENTATIVE OF AN AVERAGE SIZE SCHOOL EQUIPPED WITH LOCAL UNIT BATTERY TYPE EMERGENCY LIGHTING. THE MANUFACTURERS RECOMMEND THAT THE LEVEL OF THE ELECTROLYTE BE CHECKED EVERY TWO MONTHS ON THIS AND OTHER UNITS STANDARD WITH THE INDUSTRY. IF WE ASSUME AN AVERAGE OF FIFTEEN MINUTES TO BRING A LADDER, UNLOCK AND OPEN THE CASE, CHECK SPECIFIC GRAVITY WITH A HYDROMETER, AND ADD DISTILLED WATER AS REQUIRED, AND MULTYPLY BY SIX FOR THIS TWO MONTHS INTERVALS IN A YEAR, WE HAVE ONE AND A HALF HOURS PER YEAR FOR EACH UNIT. TEN UNITS IN OUR AVERAGE SCHOOL EQUALS FIFTEEN HOURS ANNUALLY AT $1.50 PER HOUR EQUALS $22.50. SELECTION OF SEALED LEAD ACID BATTERY UNIT ELIMINATES THIS ITEM. BATTERIES FOR EACH UNIT COSTS APPROXIMATELY $50.00 EACH. WITH A FIVE YEAR WARRANTY THEY CAN BE EXPECTED TO AVERAGE A FIVE YEAR LIFE. AMORTIZED COST PER YEAR IS THEN $10.00 FOR TEN UNITS, $100.00 TOTAL. REPLACEMENT OF RELAYS, LAMPS OR CHARGERS WILL BE RARE, POSSIBLY AVERAGE $.50 ANNUALLY PER UNIT, FOR THE SCHOOL WOULD BE $5.00 TOTAL. ORIGINAL CAPITAL INVESTMENT FOR UNITS AT $140.00 LIST PRICE, LESS 25% DISCOUNT IS $105.00 EACH TIME TEN UNITS EQUALS $1,050.00. INTEREST AT 6% WILL BE $63.00 ON THE INVEST-MENT. SEE TABLE BELOW FOR TOTALS:

ESTIMATED ANNUAL MAINTENANCE COSTS

EMERGENCY LIGHTING SYSTEMS

ENGINE DRIVEN GENERATOR SET

30 MIN. x 12 = 6 HOURS @ $1.50 PER HOUR (EXERCISING)	$ 9.00
ANNUAL AVERAGE FOR SKILLED MECHANICS, SERVICE AND PARTS	20.00
STARTER BATTERY AMORTIZED COST	10.00
INTEREST ON $2,837.98 INVESTMENT	170.27
TOTAL	$209.27

BATTERY POWERED LOCAL UNITS

BATTERY SERVICE AVERAGE 15 MINUTES x 6 PER YEAR 1-1/2 HOURS x 10 UNITS	$ 22.50
BATTERY REPLACEMENT AMORTIZED COST - $10.00 PER YEAR PER 10 UNITS	100.00
REPLACEMENT RELAYS, CHARGERS, ETC. $.50 AVERAGE PER 10 UNITS	5.00
INTEREST ON $1,050.00 INVESTMENT	63.00
TOTAL	$190.50

THUS, WE SEE THAT, IF INTEREST ON THE MONEY INVESTED IN EQUIPMENT IS INCLUDED, THE ADVANTAGE IS WITH THE PARTIAL EMERGENCY SYSTEM USING BATTERIES AS REGARDS ANNUAL COST. HOWEVER, BATTERY REPLACEMENT COST REMAINS HIGH FOR BATTERY UNITS EVEN AFTER THE ORIGINAL INDEBTEDNESS IS RETIRED.

SUMMARY:

IMMEDIATE INSTALLATION OF EMERGENCY LIGHTING, IN ADDITION TO THAT ALREADY PROVIDED BY SEPARATE CIRCUITS CONNECTED AHEAD OF THE MAIN SWITCHBUT STILL SERVED BY THE PUBLIC UTILITY, IS INDICATED IN THREE GROUPS OF EXISTING SCHOOLS.

1. AIR CONDITIONED SCHOOLS AND ADDITIONS WITH COMPACT PLANS HAVING INSIDE CORRIDORS AND INSTRUCTION AREAS ARTIFICIALLY LIGHTED.

2. MORE CONVENTIONAL PLANTS USED FOR EVENING SESSIONS:

   (A) SENIOR HIGH SCHOOLS WITH ADULT EDUCATION PROGRAMS

   (B) COMMUNITY SCHOOLS OFFERING A BROAD CULTURAL PROGRAM AT ALL AGE LEVELS AND USING ELEMENTARY, JUNIOR AND SENIOR HIGH SCHOOL PLANT.

THE NEED FOR ADDITIONAL PROVISION IS BASED ON THE DANGER OF PANIC IN CROWDS WHEN POWER FAILS DUE TO CAUSES OUTSIDE OF THE BUILDING SUCH AS HURRICANES, LOCAL STORMS, SEASONAL OVERLOAD, OR NATIONAL EMERGENCY. EVEN WITHOUT PANIC ACCIDENTS ARE LIKELY IN DARKNESS.

EXISTING EMERGENCY SYSTEMS IN DADE COUNTY'S SCHOOL SYSTEM INCLUDE GAS ENGINE DRIVEN GENERATOR SETS IN FOUR SCHOOLS BUILT AS FALL-OUT SHELTERS AND MIAMI-DADE JUNIOR COLLEGE; LINDSEY HOPKINS, DIESEL GENERATOR; CORAL GABLES HIGH, GASOLINE GENERATOR FOR THE AUDITORIUM ONLY; STORAGE BATTERY POWERED LOCAL UNITS IN AUDITORIUM AND STAGE AT NORTH MIAMI JUNIOR HIGH, NORTHWESTERN SENIOR HIGH LIBRARY ADDITION, MAYS JUNIOR AND SENIOR HIGH AUDITORIUM, ALLAPATTAH JUNIOR HIGH ASSEMBLY ROOMS AND CORRIDORS, AND GYM, AUDITORIUM AND CAFETERIA AT MIAMI SPRINGS HIGH; LOW VOLTAGE FIXTURES POWERED BY DRY CELLS AT WESTVIEW JUNIOR HIGH AUDITORIUM; AND LOCAL DRY CELL POWERED UNITS AT PALM SPRINGS, NAUTILUS, PONCE DE LEON, AND RIVIERA JUNIOR HIGH AUDITORIUMS.

OUR RECOMMENDATION FOR PROVIDING EMERGENCY LIGHTING INDEPENDENT OF THE PUBLIC UTILITY VARIES WITH THE CIRCUMSTANCE. THE MOST COMPLETE EMERGENCY LIGHTING COVERAGE INCLUDING NIGHT LIGHTS, TOILET LIGHTS AND ILLUMINATED EXIT SIGNS AS WELL AS ASSEMBLY ROOMS FOR OVER 200 PERSONS AND PASSAGES, CAN BEST BE ACCOMPLISHED BY USING THE EXISTING FIXTURES AND EMERGENCY CIRCUIT WIRING AND INSTALLING A STAND-BY GAS ENGINE DRIVEN GENERATOR SET. THIS IS OUR FIRST CHOICE FOR RECENTLY CONSTRUCTED AIR CONDITIONED SCHOOLS AND FOR OLDER SCHOOLS WHERE EMERGENCY CIRCUITS ALREADY EXIST WHICH CAN BE UTILIZED, BECAUSE IT PROVIDES THE BEST COVERAGE AND APPEARANCE.

OUR SECOND CHOICE, DICTATED BY CONSIDERATIONS OF ECONOMY, IS A BATTERY POWERED SYSTEM WITH REDUCED COVERAGE LIMITED TO AREAS OF ASSEMBLY OF OVER 200 PERSONS AND THE CRITICAL PASSAGES SERVING OTHER AREAS OF INSTRUCTION. THIS RECOMMENDATION IS FOR EXISTING

BUILDINGS WHERE THE EMERGENCY WIRING CIRCUITS DO NOT ALREADY EXIST TO WHICH A TRANSFER SWITCH AND ENGINE DRIVEN GENERATOR SET CAN BE CONNECTED. BECAUSE OF THE EXPENSE OF DUPLICATING THE WIRING TO SEPARATE OR DUAL WIRED LOW VOLTAGE FIXTURES, SELF-CONTAINED UNITS ARE USED, HAVING TRANSFER RELAY, TWO RATE CHARGER AND CONTROL RELAY AS WELL AS STORAGE BATTERY IN FULLY ENCLOSED CASE WITH FLOOD OR SPOT LIGHTS MOUNTED ON THE CASE OR WITHIN 25 FEET. OTHER THAN ATTACHING A SHELF TO THE WALL, THE ONLY INSTALLATION REQUIRED IS AN ELECTRICAL CONNECTION TO THE NORMAL POWER SOURCE SO THAT THE RELAY IS ACTUATED WHEN THIS FAILS, AND THE CHARGER HAS A SOURCE OF CURRENT WHEN THE NORMAL POWER RETURNS.